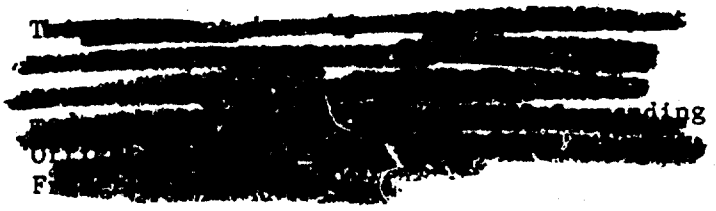
TRANSLATION NO. 237

DATE: July 1968

(1)

DDC AVAILABILITY NOTICE



DEPARTMENT OF THE ARMY
Fort Detrick
Frederick, Maryland

This document has been approved for public release and sale; its distribution is unlimited

An Experiment on Classifying Winter Wheatby Their Infection by Wheat Rust.

by L. F. Rusakov

Bolezni Rasteniy. v. 16-19: pp 54-65: 1927-1930.

In the early spring of 1927 (26 March) rust was not detected on the winter wheat in spite of its presence in the fall. This was clearly as a result of the death of the leaves and the rust itself from the acute temperature fluctuation caused by the covering of snow. In any case, it was characteristic that towards the end of March, the winter wheat's leaves in Eisk yellowed particularly strongly and had a smaller percentage of green leaves in comparison with Rostov, Krasnodar and particularly Stavropol.

Repeated observations detected the rust no earlier than 15 May, when the winter varieties attained a height of from 21 cm (kosobryukhovka and erythrospermum 0.23 that had overwintered poorly) to 47-49 cm. (ukrainka stepnyachka and gorkonkur).

The calculation of the rust was made by means of a computation of the plants with rust for an established time interval. In 5 minutes it was possible to scan up to several hundred plants in 2-3 adjacent rows to a length of 5 m. A survey of the plants in established squares (of 3-5 m) is irrational, as should the areas fall into microtopographical depressions or raises, particularly when the field is used in the winter or sowed in dry weather, the plants in the test will prove to be of dissimilar quantity and with a variegated greenness of the leaves. To proceed from a survey of a certain quantity of plants is also unthinkable in view of the impossibility of accurately counting them by the root without pulling them out.

On 15 May, for a 5 minute search in the separate plots of the winter varieties, there were from 0 to 2 plants with rust (Puccinia triticina Erikss.), whereupon, for the 3 hr 10 min spent on all 37 plots, 28 sick plants were found. On the following day, in the summer varieties, almost the same number of plants were found (26), but in half the time. Moreover, it is important to note that in 5 min it was possible to find up to 4 sick plants. The fact of the more frequent location of rust on the summer varieties, and not on the winter, indicates that the appearance of the rust is not from the local winter varieties, but from somewhere without.

The following are indicative that the rust was introduced: 1) its absence on the winter wheat during the 2 months after winter wheat starts to awaken (from the middle of March); 2) the presence on the sick plants of no more than one pustule per plant; 2 cases constitute exceptions, when there were 2-3 pustules on a leaf, but the second and third so closely adjoined the first and were so minor, that one might even saythat several pustules emerged from one spot of the primary infection; 3) there was not a case where 2 rust plants were adjacent, this would have indicated that one had infected the other and consequently, that rust had been present in the plot earlier.

After a 5-hour survey of the plots, the impression was received that the rust infection was as though it had fallen from above and was equally distributed over the field. Also, the comparatively small sizes of the pustules attested to the recent appearance of the rust.

The time of the appearance of the P. triticina pustules must correspond to the 13th-14th of May, and the infection of the young crop approximately 12-13 days earlier because, with the low average temperatures at the beginning of May, the incubation period must be no less than 12-13 days. Data of other observations completely substantiate the reality of these time periods because the first P. triticina spores were caught with an aeroscope on 30 April (10) and 1 May (4). The germination of the spores could have been on these days as on the night prior to 1 May there was a dew and on the morning of 1 May there was a rain, 0.3 mm. Table 1 presents the condition of the winter wheat at the time the rust pustules made their appearance.

(See table 1)

The data used in the table are for 50 plants (10 of each variety), and as shown, not one of them were infected with rust.

Towards the middle of May the spread expressed itself in fractions of a percent and was significantly less than that in the Rostov region where the rust on the winter varieties had overwintered and by 25 May, regardless of the dry weather, had developed higher than the average, equalling for the leaves of the intermediate stages, 3½ marks with a maximum of 3¾ marks.

In May dry weather continued through all of May and June. This, however, was not unfavorably reflected in the winter varieties. It is evident that an adequate moisture supply was in the soil, and that the relative humidity and t° of the air did not undergo any prolonged, acute variations (absolute maximum in May, 29.6°; in June, 34.5°).

For the rust significantly worse conditions of humidity were created; there were only two rain-falls in May (1.3 mm and 0.8 mm on the 13th and 15th), these gave a total of only 2.1 mm. In June there were no rains until the 23rd day, when the first and last rain for the month fell in a quantity of 11.3 mm, too late for the rust. For these 2 months there was not one heavy dew, as is required for the germination of rust spores. And, of course, the rust did not attain that strength of development which was noted for Rostov, but yet, characteristically, P. triticina displayed its amazing drought resistance: utilizing only 2 small rains and approximately 20 very weak and short dews, it struck the second growth with a 3-3/4 - 4 mark strength after all.

The phases of development of the wheat under the conditions of 1927 took a sufficiently favorable course; full heading and milk ripeness were mainly achieved in all varieties over a span of 3-4 days (table 2)

(See table 2)

A month after the appearance of rust, towards the 15th of June, when the majority of the varieties was in the phase of milk ripeness, all 38 varieties

were arranged into 4 groups of dissimilar infection by P. triticina (see table 3) according to the data of rust calculation (5). For the division into groups the total marks of the four upper leaves were taken into consideration. This was also expressed by a certain number of units or portions of units, whereby 250 pustules (3½ marks) corresponded to a unit. The varieties having a general infection of the four leaves of 0.4-0.7, i.e., 100-175 pustules on the four leaves, were included in the first group; in the second group, those with an infection of 0.75-0.95; in the third group, 1.00-1.35; and in the fourth, 1.55-2.5 units. It is already evident from the characteristics of the group that the least infected variety has 6 times less pustules than the most infected (0.4 and 2.5).

After 2 weeks, 28 June, at the last rust calculation, the extremes differed by 14 times (table 4).

(see table 4)

Transferring from the extreme to the two middle groups (II and III), it is necessary to note that regardless of a very similar infectionit is still possible to give sufficiently detailed characteristics of the varieties in relation to the infection by the rust. For this, it is necessary to compare the development of rust to the two last observational periods (15th and 28th of June) in consideration of the effect of the early ripening. The fact is that, according to N. I. Litvinov (2), varieties which were identically affected at a certain moment of account (for instance, on 15 June) may prove to be differently affected at the attainment of the same phase of development. In other words, when other conditions are equal, with one variety early ripening and the other late ripening, then on the whole the late ripening variety is affected more strongly. An idea of the earliness of the varieties, describing more accurately the speed of ripening in the conditions of the given year, may be obtained by proceeding from the degree of drying in the leaves of the various stages because, with the absence of scorch and strong rust there were no factors to give rise to an uneven and abnormal drying of the wheat leaves to a notable degree.

All the varieties were broken down into two practically equidimensional groups (of 17 and 21 varieties) by the degree of greenness of the leaves. 17 varieties with greener leaves and 21 with dryer leaves. In the first group of varieties the total of the green surfaces of the leaves ranges from 0.2 to 0.8 (left half of table 3), in the second group, from 0.9 to 1.75 (right half of table 3).

The figures for the minimum and maximum drying of the leaves in the different varieties were characteristic (table 5). For the three upper leaves we have on the one side 1.25-1.35 dry surfaces and subsequently 1.75-1.65 green, while on the other there are 2.65-2.8 dry and 0.35-0.2 green, i.e., 5-8 times less.

(see table 5)

Inspecting the number of the greener and the dryer varieties by groups, we have a gradual growthin the percentage of the green varieties while moving to the more affected groups (tables 3 and 6): the percentage of the green

varieties rises from 17 to 100. Also correspondingly increased is the degree of withering of the upper and penultimate leaves.
(see table 6)

Therefore the greater greenness of the leaves corresponds to the groups of greater infection, in other words, the greater infection is connected with the late maturing. This connection is worthy of serious attention and must be taken into consideration by the selectors.

Changing from the characteristics of the groups to the separate varieties within the limitations of the group, we, in virtue of individual properties of the varieties, find a few exceptions of the rule that was just given; thus; in group I there is a very green variety, bastard white; in group II are 5 green varieties, etc. This phenomenon with a consideration of the final disease will help us to separate the most affectable variety.

The greenest group-late ripening varieties. From I, ic, the least affected group, comes the variety, bastard white, which by 15 June had almost 1½ green leaves and therefore could be affected in the future; actually, it was affected, and out of the 7 varieties of group I only on it did the upper stage's infection amount to 3½ marks (250 pustules) by 28 June in comparison to 2½ marks (35-40 pustules) by 15 June. In group II the white awned 2707 variety was sharply outstanding according to the intensification of rust; there was a weak intensification for the green of the nigroar. of the secondary selection and erythr. 917. In group III among 9 varieties the infection increased notedly in four - the red awnless, bastard red, erythr. 173 and erythr. 0.23 (instead of 1.0-2.7) which must also be separated out of group III into the more affectable. In group IV which consists exclusively of the late ripening varieties, there was a sharp increase noted in the infection of the upper leaf - in the kosobryukhovka, to 4 marks; in the kooperatorka, to 3 3/4 marks; and in triumf Podolila, to 3½-3/4 marks.

These three varieties, transferring into the next group,V, where the total of rust presence equalled 3-5, must be acknowledged as the most affectable of the 7 units, both in virtue of the late ripening and as a result of lesser immunity which is established by the interior physiological properties of the cells. In the remaining wheat of group IV - gorkonkur, miltur. 0.40 and alb. 676 - the mark of the most infected stage of leaves equalled only 3¼-3½; the total of the infection increased weakly, therefore, they remain in this group.

The group of fast ripening wheat. The general division of the wheat into 4 groups in the first place is related to the fast withering wheat; here the amplitude of infection of the separate varieties is not great (a variation of no more than 3 times), the absolute intensities of the infection are minor (2⅔, 3, 3¼ marks) and were slightly changed by the last period of observations; the rust was notedly intensified only on the variety, erythr. 73 (from 3 to 3½-3⅔ marks for the upper leaf). It should be said of this group, that under conditions of an earlier appearance of the rust and of a strong development of it, the affectability would have approached that in the late ripening wheat.

The final grouping of the varieties. The infection of the second growth by the time of the second ripening is in complete accordance with the general

grouping of the varieties for the vegetational period (table 7). With a change to the more affected groups, we have at first a tapering off of the mark to $3\frac{1}{2}$; later, 3 3/4. In group I the infection of the second growth was equal to $3\frac{1}{2}$ and 3 3/4 marks; in group IV, only 4 marks.

(see table 7)

The final grouping of the varieties is presented in table 8, where the infection at the two periods of observations was taken into consideration, also taken into consideration were the rates of withering of the leaves under the given year's conditions and the infection of the second growth. It is evident from it that 1) under the conditions of 1927 (thinning for the winter, a dry summer, a later appearance of the disease) the least infected proved to be nigroar. 392, erythr. 3251, ukrainka 246, stepnyachka, nigroar. mass. otb., erythr. 538 (100-175 pustules on all stages of the leaves). Of the fast ripening varieties near them, there are: novokrymka 102, krymskaya 265, erythr. 364, ferrug. 65, white awned (belyy ostistyy) 2704, ferrug. 346, banatka, unimproved (neuluchshennaya) and hostianum 237; and of the late ripening; zemka, nigroar. of the second screening (nigroar. 2-go otbora) and erythr. 917. 2) The following were the most affected: kosobryukhovka, triumf Podoliia and kooperatorka 676 (having up to 1,500 pustules). Near them in high initial infection, but distinguished from them by a weak rust intensification by the end of the vegetation are: gorkonkur, milt. 0.40 and albidum 676. 3) The following late ripening varieties were affected above the average: erythr. 173, bastard red (bastard krasnyy), red awnless (krasnaya bezostaya), erythr. 23 and the white awned 2707. 4) Teyskaya, nepolegayushchaya 1351, local (mestnaya) and ferrug. 117 are characterized by a rather fast infection, which, however, by the end of the vegetation did not attain a high degree. 5) The improved local wheat (nigr. 392, nigr. mass. otb., nigr. of the second selection) proved to be among the most sturdy and presents a favorable material for selection.

As a consequence of the late appearance of the rust, there was no attempt made to connect the disease with the harvest data.

In conclusion a few words must be said concerning the evolution of rust in connection with the fast ripening in general and with the rate of maturity in different years.

It is generally known that for the majority of the natural-source (est.-ist.) Rayons, a retardation in the ripening because of a late or sparse crop is accompanied by an intensified affection by rust. For the northern Caucasus in this regard, the data of S. V. Maksimov are worthy of attention. They are concerned with the fact that in 1925 the spring wheat of a normal crop, as a result of a sand storm on the 27th, 29th and 30th of April, lost almost its complete leaf surface and was forced to begin its growth anew; the crop was changed, as though it were late and sparse, and as a result was very strongly affected by rust (3). Later, according to our data, in the Eisk agricultural test station the winter wheat of the early and particularly of the late crop periods were thinned, towards spring, more severely than that of the median crop period and finally, as a result of intensified tillering, ripened with such lateness that both the late and the early crop periods were struck many times more than the median period.

As concerns the varieties, among those discussed above, Kooperatorka stands out sharply. This variety, according to the data of the Khersonskii test station of the Essentukskii test field and the collective variety-testing of winter wheat for the sugar trust (4, 6, 1), belongs, together with Ukrainka and zemka, to the early ripening. At the Eisk test station this wheat, after the unfavorable winter of 1926-1927, thinned its grasses the most, this produced a retardation of its vegetation; as a result of this it proved to be: 1) among the latest in ripening and 2) the most affected. In Rostov and the other places where there was a good overwintering it was one of the first to ripen and was little affected by rust. From this comes the conclusion that to understand the affectability of varieties by rust, one must not only consider the earliness, but also introduce those rectifications of the factors which alter the rate of vegetational phase changing. Moreover, aside from the data concerning the phases, information as to the degree of greenness of the leaves is necessary.

Literature

1. A.M. Levshin. Results of collective variety testing of winter wheat at sugar-trust stations in 1922/23-25/26. Kiev. 1927. p. 272

2. N.I. Litvinov. Concerning the different resistances of the summer forms of grains in relations to their affection by rust. Tr. Byuro Prikl. Bot., Oct. 1912.

3. S.V. Maksimov. A short account on selection in a test plot by the Donetskii test station for 1925. Izv. po op. delu Sev. Kavkaza. t. 9, p. 527.

4. An account of the activity of the Khersonskii agricultural test station in 1925-26. Vyp. 51. 1928, p. 52.

5. L.F. Rusakov. A combined scale for the calculating of the development of rust. Bol. Rast., 1927, vyp. 3-4, p. 179.

6. A.A. Khotin. An account of the test field at Essent. test station from 1924 through 1926. Izv. po op. delu Sev. Kavkaza. t. 10, p. 345.

Footnotes

1. From the works of the Microbiological and Phytopathological Laboratory imeni A.A. Yachevskii.

2. By the scale adopted by us; see "Bolezni Rast.", [illegible], vyp. 3-4.

As concerns the varieties, among those discussed above, kooperatorka stands out sharply. This variety, according to the data of the Khersonskii test station of the Essentukskii test field and the collective variety-testing of winter wheat for the sugar trust (4, 6, 1), belongs, together with ukrainka and zemka, to the early ripening. At the Eisk test station this wheat, after the unfavorable winter of 1926-1927, thinned its grasses the most, this produced a retardation of its vegetation; as a result of this it proved to be: 1) among the latest in ripening and 2) the most affected. In Rostov and the other places where there was a good overwintering it was one of the first to ripen and was little affected by rust. From this comes the conclusion that to understand the affectability of varieties by rust, one must not only consider the earliness, but also introduce those rectifications of the factors which alter the rate of vegetational phase changing. Moreover, aside from the data concerning the phases, information as to the degree of greenness of the leaves is necessary.

Literature

1. A.M. Levshin. Results of collective variety testing of winter wheat at sugar-trust stations in 1922/23-25/26. Kiev. 1927. p. 272

2. N.I. Litvinov. Concerning the different resistances of the summer forms of grains in relations to their affection by rust. Tr. Byuro Prikl. Bot., Oct. 1912.

3. S.V. Maksimov. A short account on selection in a test plot by the Donetskii test station for 1925. Izv. po op. delu Sev. Kavkaza. t. 9, p. 527.

4. An account of the activity of the Khersonskii agricultural test station in 1925-26. Vyp. 51. 1928, p. 52.

5. L.F. Rusakov. A combined scale for the calculating of the development of rust. Bol. Rast., 1927, vyp. 3-4, p. 179.

6. A.A. Khotin. An account of the test field at Essent. test station from 1924 through 1926. Izv. po op. delu Sev. Kavkaza. t. 10, p. 346.

Footnotes

1. From the works of the Microbiological and Phytopathological Laboratory imeni A.A. Yachevskii.

2. By the scale adopted by us; see "Bolezni Rast.", 1927, vyp. 3-4.

Table 1

Name of variety. / Stage of leaves.	Stepnyachka		Fer. 0.65		Fer. 117		Fer. 945		Local (Mestnaya)	
	Height of leaf atchmnt	Withering	Ht.	With.	Ht.	With.	Ht.	With.	Ht.	With.
Upper	41	-	34	-	32	-	24	-	24	-
Second	41	-	34	-	32	-	24	-	24	-
Third	35	-	29	0.01	25	0.01	19	0.02	17	0.01
Fourth	18	0.1	16	0.05	13	0.05	9	0.1	8	0.15
Fifth	6	0.95	7	0.65	6	0.65	4	0.75	3	0.6

TABLE

Table 2.

	30 May	31 May	1 June	2 June	3 June	4 June	11 June	12 June	13 June	14 June	15 June	16 June	17 June
	Full heading						Milk Ripeness						
Ferrug. 0.65 Stepnjach Ka Nov. Krymka													
In 5 varieties													
In 9 varieties													
In 14 varieties													
In 5 varieties													
In 3 varieties													
Ferrug. 0.65													
In 5 varieties													
In 7 varieties													
In 13 varieties													
In 8 varieties													
In 2 varieties													
Kosobryukhovka													

Table 3 (Part 1)

The wheat with the dryer leaves.

	Nigr. 392			Er. B-3251			Ukrain.			Stepnyachka		
	58	0.8	2½-3	64	0.5	2½ (3)	74	0.65	2½ (3)	68	0.7	2½ (2½-3)
I	35	dry	2-2⅔ (2½)	40	0.75	2½-3	48	dry	3	42	0.9	3
	21	dry	1½-2	24	dry	2	31	dry	2-2½	25	dry	2-2½
	13	dry	-	16	dry	1	19	dry	1½	13	dry	1½-2
	0.2 gr.-0.4 rust			0.75 g.-0.45 r.			0.35 g.-0.6 r.			0.4 g.-0.6 r.		
	Novokr. 102			Krymka 267			Erythr. 364			Fer. 65		
	60	0.65	3 (3-3½)	62	0.5	3	62	0.4	3 (3½)	72	0.6	3
II	33	dry	3	37	dry	3	36	dry	3	47	0.9	3
	19	dry	2½	21	dry	2½-3	21	dry	2½	31	dry	2½
	11	dry	1	13	dry	2½	12	dry	2	18	dry	2
	0.35 gr.-0.75 r.			0.5 g.-0.95 r.			0.6 g.-0.8 r.			0.5 g.-0.8r.		
	Wh. awn. 2704			Fer. 346			Ban. neul.			Host. 287		
	74	0.55	3	70	0.7	2½-3 (3)	66	0.7	3 (3-3½)	66	0.4	3
II	48	0.7	3	44	0.9	3-3½	40	0.9	3-3½	42	0.85	3-3½
	31	0.95	2½	27	dry	2½	24	dry	2½	26	dry	2½
	18	dry	1½	16	dry	1½	14	dry	1½	15	dry	2
	0.8 g.-0.8 r.			0.4 g.-0.85 r.			0.4 g.-0.9 r.			0.75 g.-0.95 r.		
	Er. 160			Er. mass. otb.			Er. 73					
	63	0.7	3-3½	63	0.45	3	72	0.45	3 (3½-½)			
III	38	dry	3-3½	40	0.9	3½	47	0.85	3½			
	23	dry	2½	24	dry	2½-3	30	dry	3			
	13	dry	1½	13	dry	2	17	dry	2			
	0.3 g.-1.05 r.			0.65 g.-1.15 r.			0.7 g.-1.25 r.					
										Gorkonkur		
										73	0.3	3-3½ (3½)
IV										48	0.8	3½-½
										31	dry	2½-3
										18	dry	2½
										0.9 g.-1.6 r.		

Table 3 (Part 2)

						The wheat with less dry leaves.								
Nigr. mass. otb.			Er. 538								Bastard white			
61	0.5	2½	70	0.45	2½-3						73	0.15	2½ (3½)	
39	0.8	3	45	dry	3				I		48	0.5	3 (3-3¼)	
24	dry	2½	28	dry	2						31	dry	1½	
15	dry	2-2¼	16	dry	1						16	dry	1	
0.7 g.-0.7 r.			0.55 g.-0.6 r.								1.35 g.-0.5 r.			
Zemka			Nigr. 2 otb.			Er. 917			Wh. awn. 2705		Wh. awn. 2707			
63	0.2	3	57	0.2	2½ (3)	70	0.15	3	69	0.3	3 (3¼)	70	0.05	3 (3½)
39	0.65	3	36	0.6	3	48	0.55	3	44	0.75	3 (3-3¼)	46	0.3	3-3½ (3½-3¾)
24	dry	2½-3	22	dry	3	31	dry	2½	28	dry	3	31	0.9	2½
15	dry	2	13	dry	2	20	dry	1	17	dry	2	18	dry	2
1.15 g.-0.9 r.			1.2 g.-0.8 r.			1.3 g.-0.75 r.			0.95 g.-0.95 r.		1.75 g.-0.95 r.			
			Fer.117			Local			Er. 23		Nepoleg.			
			70	0.15	3-3¼	60	0.2	2½ (3)	55	0.2	2½-3 (3½-3¾)	70	0.3	2½-3 (3)
	III		47	0.6	3-3¼ (3¼)	40	0.55	3¼	34	0.8	3-3¼	45	0.5	3-3¼
			30	0.9	2½-3	25	0.95	3	20	dry	3	28	0.95	3
			17	dry	2	13	dry	2½	13	dry	2	17	dry	2
			1.35 g.-1.15 r.			1.3 g.-1.15 r.			1.0 g.-1.0 r.		1.25 g.-1.0 r.			
Er. 173			Teys. Nva			Bastard red			Red awnless		Fer. 945			
71	0.3	3 (3½)	69	0.1	3 (3-3¼)	75	0.2	2½-3	70	0.1	3 (3½)	69	0.1	3 (3-3½)
45	0.8	3¼	47	0.65	3¼	51	0.5	3¼ (3¼-3½)	47	0.6	3½	48	0.35	3¼
28	0.95	3	31	dry	3	34	0.9	3-3¼	31	dry	3	33	0.9	3
17	dry	2-2½	17	dry	2	22	dry	2½	19	dry	1½	20	dry	2½
0.95 g.-1.3 r.			1.25 g.-1.25 r.			1.4 g.-1.35 r.			1.3 g.-1.2 r.		1.65 g.-1.3 r.			
Kosobryukhovka			Kooperatorka			Milt. 0.40			Triumf II		Alb. 676			
66	0.2	3¼ (4)	57	0.05	3 (3¼)	73	0.1	3 (3-3¼)	78	0.15	3-3¼ (3½-3¾)	68	0.05	3½ (3½-3¾)
41	0.55	3½ (3¼-4)	35	0.6	3½ (3½-3¾)	48	0.55	3¼-½	53	0.45	3½ (3½-3¾)	47	0.3	3¼
25	dry	3½-¾	22	0.95	3¼	32	dry	3	37	0.95	3-3½	31	0.9	3
15	dry	2½	13	dry	3	19	dry	2½	22	dry	2-2½	19	dry	2½
1.25 g.-2.5 r.			1.4 g.-1.75 r.			1.35 g.-1.55 r.			1.45 g.-1.95 r.		1.75 g.-1.6 r.			

Footnote: The first vertical row in the boxes- height of attachment of the leaves; second- withering of the leaves expressed in decimals of the surface area; third- the degree of infection in marks (ball).

Table 4

Stages	Nigr. 392	Kosobr.	Difference
Upper	2½-3 marks	4 marks	14 times
2nd from above	2½ "	3¾-4	14 times
3rd from above	1½-2 "	3½-3½	13 times

Table 5

Stages	Minimum			Maximum		
	Alb. 676	Wh. awn. 2707	Fer. 945	Nigr. 392	Ukrain. 246	Novo-krymka
Upper	0.05	0.05	0.1	0.8	0.65	0.65
2nd from above	0.3	0.3	0.35	dry	dry	dry
3rd from above	0.9	0.9	0.9	dry	dry	dry
Σ	1.25	1.25	1.35	2.8	2.65	2.65 dry

Table 6

Groups	No. of varieties		%	Degree of dryness of the leaves	
	Green	Dry	GR.	Upper	2nd fr above
I	1	6	17	0.54	0.85
II	5	8	39	0.41	0.77
III	9	3	75	0.27	0.62
IV	6	0	100	0.15	0.54

Table 7

Group	Mark	3		3½		4			
		Seldom	Medium	Sel.	Mod.	Very sel.	Sel.	Med.	Often
I	Early	1	1	4	-	-	-	-	-
	Late	-	1	-	-	-	-	-	-
II	Early	1	-	2	-	2	2	1	-
	Late	-	-	1	-	-	1	3	-
III	Early	-	-	2	-	-	-	1	-
	Late	-	-	1	-	-	2	3	3
IV	Early	-	-	-	-	-	-	-	-
	Late	-	-	-	-	-	1	1	4

Table 8

Groups: At the first period	Groups: At the second period	Mark 3½	The Early-Drying.	The Late-Drying
I	I	0.4-0.7	Nigr. 392, erythr. B-3251, ukrain., stepnyachka, nigr. mass. otb., erythr. 538	-
	IV	1.5-2.5	"	Bastard white.
III	II	0.75-0.95	Novokrym., krymka 267, ferrug. 65, wh. awn. 2704, ferrug. 346, host. 237	Zemka, nigr. 2nd Sel., erythr. 917
	III	1.0-1.35	Erythr. 364, banatka neul.	White awned 2705
	V	2.7-5.7	-	White awned 2707
IV	III	1.0-1.4	Erythr. 160, erythr. mass. otb.	Local, Nepoleg. 1351, Teyskaya ferrug. 117.
	IV	1.5-2.5	Erythr. 73.	Erythr. 173, bast. red, red awnless, ferrug. 945.
	V	2.7-5.7	-	Erythr. 23
IV	IV	1.5-2.5	-	Gorkonkur, Milt. 040, elb. 676.
	V	2.7-5.7	-	Kosobryukhovka, kooperatorka, Triumf.